LECTURES IN NATURAL SCIENCES AT CAMBRIDGE

THE following lectures in Natural Science will be given at Trinity, St. John's, Christ's, and Sidney Sussex Colleges, during Michaelmas Term 1874.

On Electricity and Magnetism.—By Mr. Trotter, Trinity College, in Lecture Room No. 11. (Mondays, Wednesdays, Fridays, at 11, commencing Friday, Oct. 16.) Students desiring to attend this course are requested to call upon Mr. Trotter at his rooms on or before Thursday, Oct. 15. Students of Colleges other than Trinity, St. John's, Christ's, and Sidney, can be admitted on payment of a fee of 1*l.* 1*s.*

On Elementary Organic Chemistry.—By Mr. Main, St. John's College. (Tuesdays, Thursdays, Saturdays, at 12, in St. John's College Laboratory, commencing Tuesday, Oct. 20.) Instruction in Practical Chemistry will also be given. Students desiring this instruction are requested to call upon Mr. Main on or before Monday, Oct. 19. For members of Trinity, St. John's, Christ's, and Sidney, the fee for the lectures in Chemistry is 10*s.* 6*d.*, and for instruction in Practical Chemistry 1*l.* 1*s.* per term; for others the fees are respectively 1*l.* 1*s.* and 2*l.* 2*s.* per term.

On Palæontology.—(The Protozoa and Cœlenterata.) By Mr. Bonney, St. John's College. (Tuesdays and Thursdays, at 9, commencing Thursday, Oct. 15.)

On Geology.—(For the Natural Sciences Tripos. Preliminary matter and Petrology.) By Mr. Bonney, St. John's College. (Mondays, Wednesdays, and Fridays, at 10, commencing Wednesday, Oct. 14.) A course on Physical Geology will be given in the Lent Term, and on Stratigraphical Geology in the Easter Term. Papers will be given to Questionists every Saturday at 11, but the first paper will be set on Wednesday, Oct. 14, at 11, when arrangements will be made for further instruction, should it be required. Students desiring to attend any of these courses are requested to call upon Mr. Bonney on or before Wednesday, Oct. 14. Students of other Colleges can be admitted to these lectures on payment of a fee of 1*l.* 1*s.* for the course. An Elementary Course will be given in the Lent and Easter Terms.

On Vegetable Morphology.—(For the Natural Sciences Tripos.) By Mr. Hicks, Sidney College. (Tuesdays, Thursdays, and Saturdays, at 11, in the Taylor Lecture Room, beginning on Tuesday, Nov. 3.) The lectures during this term will be on the Morphology of Phanerogamia. For members of the above Colleges the fee for this course is 1*l.* 1*s.*; for others 2*l.* 2*s.*

A Course of Practical Physiology and Histology.—By the Trinity Prælector in Physiology (Dr. Michael Foster) at the New Museums. Lectures on Tuesdays, Thursdays, and Saturdays, at 10, commencing Tuesday, Oct. 20. Fees for the Practical Class, 3*l.* 3*s.*; for the course of two terms, 5*l.* 5*s.* This course is intended for those who have gone through a course of Elementary Biology similar to that given last Easter Term.

Also a short course of lectures on the *Physiology of Nutrition*, on Wednesdays, at 10, commencing Oct. 21.

On the Comparative Anatomy of Invertebrata.—By Mr. Martin, Christ's College. (Mondays, Wednesdays, and Fridays, at 12, commencing Friday, Oct. 16.)

NOTES

AMONG the Fellowships at Trinity College, Cambridge, awarded on Saturday last, one was given for proficiency in Natural Science. Although thrown open to the whole University, it was gained by a member of Trinity College, Mr. Francis M. Balfour, B.A., the circumstances of whose election are worthy of notice. The Fellowships at Trinity College are awarded according to the results of an examination held specially for the purpose, and not as in other Colleges, according to the positions gained by the candidates in the University Examinations or Triposes. The Natural Science Fellowship was no exception to this custom: a special examination in Physics, Chemistry, and Biology, was held in order to test the proficiency of the candidates. But it had previously been announced that the examiners were prepared in estimating the proficiency of the candidates to take into consideration records of original work in the shape of published memoirs or unpublished dissertations, and to be guided by the value of these as well as by the ordinary examination answers. In other words, the authorities of Trinity College formally declared that they were prepared to bestow a Fellowship *as a reward for, and thus as an encouragement to, research.* Mr. Balfour's success in his candidature was, we understand, due to the value attached to the original memoirs, chiefly on embryological subjects, sent in by him, as well for their actual worth as for the future of which they gave promise. We congratulate him and the Natural Science School at Cambridge on the result. The deadening influence of the examination system at Cambridge, great as it is in mathematics, bears with fearful effect on all Natural Science studies. The cramming necessary for success in a competitive examination such as the Natural Science Tripos, renders original research for the time being impossible, and goes far to destroy all power for it in the future. Mr. Balfour had the courage to commence original work before he had taken his degree. In spite of warnings that he was endangering his position in the Tripos, he chose the better part, and spent in research the time he might have frittered away in cramming for an examination. Incidentally he has thereby won a Fellowship. We trust that his example will be followed by other students, and the example of Trinity College by other Colleges, so that henceforward on the one hand early research may be the rule at Cambridge instead of the exception, and on the other the injurious effects of the Fellowship system may be lessened as much as possible.

THE following changes are proposed to be made in the Council of the Mathematical Society for the ensuing session:—Dr. Hirst, F.R.S., the retiring president, will become a vice-president, and be succeeded by Prof. H. J. Stephen Smith, F.R.S. Mr. Spottiswoode, F.R.S., having served his term of office as vice-president, will become an ordinary member of the Council. The vacancies caused by the retirement of Prof. Henrici, F.R.S., and Mr. J. J. Walker, have been filled up by the selection of Mr. R. B. Hayward and Mr. W. D. Niven. The Society has nearly completed its tenth year, and has had as presidents De Morgan, Sylvester, Cayley, Spottiswoode, and Hirst. It would, we think, be difficult to find more fitting representatives of the mathematical ability of this country, should the day ever arrive, in this day of congresses, for holding an International Congress of Mathematicians. When the Society started into existence on Jan. 16, 1865, there were, we believe, not more than two similar societies in the world; now, each year adds to the ever-lengthening chain. It is a singular and sad coincidence that as the present president on his accession to the chair had to announce to the members the great loss the Society had sustained through the death of the lamented Dr. Clebsch, so, too, as he vacates his office will it be his last task to tell of the decease of Dr. Otto Hesse; though in this sad case mathematicians have to mourn the loss of a man full of years and honours. The Society is thus left without a representative of the great body of German mathematicians in its list of foreign members. The election of the new Council will take place on Nov. 12. The above-named changes are those suggested by the present Council, and will be submitted in the usual way to all the members of the Society for their approval.

ANOTHER College for Working Women is about to be opened. Its inaugural meeting is announced for Friday evening, at No. 5, Fitzroy Street, Fitzroy Square. The committee aims at enabling women who can spare a few evenings a week to obtain gradually a liberal education. The fees are very low, and the classes numerous. A library and a coffee and conversation room will, it is hoped, promote friendly intercourse amongst the members. Many have promised to teach or occasionally lecture, amongst whom we see the names of Mr. J. G. Fitch, Mr. Thos. Hughes, Q.C. (Principal of the Working Men's College), Mr. Litchfield, Prof. Seeley, Mr. George Macdonald, Miss Chessar, Miss Keary, and Dr. Morell.

IN connection with the *conversazione* held at the opening of Owens College, Manchester, there was an interesting loan collection brought together through the energy of Mr. W. B. Dawkins and Mr. R. D. Darbishire. A large series of plants of the coal measures was exhibited, with specimens of the nearest known living representatives systematically placed among them to convey an idea of the kind of vegetation from which coal was formed. Near these was a geological model of a boring for coal. A quaint set of stone mining tools from the abandoned workings of the Alderley Edge copper mines, and wooden and iron tools found in Derbyshire, were of especial interest. The local geology was well illustrated, and there was a fine collection of fossil bones which have been recently discovered in a fissure at Windy Knoll, near Castleton, by Mr. Pennington. A well-supported endeavour was made to illustrate the latest stage of vertebrate life in England as known by the remains found in bone caves and river deposits; and an extensive collection of mammoth, bear, lion, and other bones was the result. Near these were cases containing early implements fashioned by man. A Manchester paper says of these cases: they "include all the evidence as to the antiquity of man given by both river and cave, and we need little scientific assistance to find out that these constitute the most complete set of stone implements ever got together. To make their evidence clearer, illustrated and explanatory diagrams are placed near them. . . . The collection of neolithic flints is wonderfully complete. A case sent by Mr. John Evans carries us from the rough model to the same instrument more exquisitely finished and moulded."

THERE is hope for scientific education when a sporting correspondent of the *Field* discourses on it. The gentleman in question has recently visited the Mining Academy of Freiberg, which he thus describes:—"Students of every nationality are found here, and there is no doubt that if a man likes to work he can learn a great deal, as some of the most celebrated professors in Germany are teachers. The only requisite for a student entering the Academy is that he should know a little German. This rule is not very strictly observed, and anyone of ordinary intelligence ought to pick up the requisite amount in a month, or six weeks at the outside. There are different courses open to the option of the student, such as an assaying course, chemical course, surveying and mining course, &c. These are each charged separately for, the fees ranging from 3*l.* to 5*l.* each. The blow-pipe course, given by the famous Prof. Richter, is 6*l.* Foreign students are charged 5*l.* yearly extra; German students are exempt from this tax. Living in Freiberg is excessively cheap. The whole course lasts three years, but I imagine that a man would do far better by picking out a few particular lectures and finishing in eighteen months or two years. Now, after the course, what return has a man for his money? I unhesitatingly answer that a man who has worked hard for two years at Freiberg ought to be able to go anywhere in any mining district in the world and command his 500*l.* a year. So many people are troubled with questions as to what to do with their younger sons, that I am sure that sending them to Freiberg, and giving them a first-class profession in two years for 375*l.* or 400*l.*, is well worth their consideration. To such a man, *i.e.*, one well educated at Freiberg, the whole of the American continent, and, indeed, most of the world is open. Now that England is so 'blocked' it has become a necessity to go further afield, and probably mining engineering and assaying offer about the very best openings to an enterprising man. Immense deposits of metal are daily being discovered in Colorado and the south-western States, while Chili and Peru are short-handed." The sporting correspondent is correct as far as he goes, and it is perfectly true that many young Englishmen have gone to Freiberg, but he does not seem to know that the British Government has just fitted up a small cellar in Jermyn Street, and that with such a national metallurgical laboratory as this, of which of course the country should be justly proud, there is no fear that more young Englishmen will seek to perfect their studies in a foreign land.

FROM a paper on "Some indigenous Tuscan Remedies," read by Mr. H. Groves before the recent Pharmaceutical Conference, it would seem that plants furnish a considerable portion of the medicinal products in use in that country. Many of the plants enumerated are well known as medicinal plants in other parts of Europe. The Chamomile (*Matricaria chamomilla*), for instance, is said to be found in the cupboard of every housewife, being used as a calming antispasmodic, and also applied hot externally for relieving pain. A custom very prevalent in Tuscany seems to be the administration of herb-juice in spring, which is prepared daily by many herbalists, and is also ordered by medical men. *Nasturtium officinale*, known as Crescione, is used in conjunction with *Cochlearia officinalis* in the composition of herb-juice. This latter plant, though indigenous, is also cultivated to some extent. The flowers of the Wallflower (*Cheiranthus cheiri*), under the name of *Viole gialle*, or Yellow Violets, are boiled in olive oil and used for enemata. With regard to products other than plants, the writer remarks that viper-broth is gone out of fashion, and the pharmacist is spared keeping those reptiles and the pincers with which they were handled. Snail poultices are still used in the country. The snails are applied alive, the shell being crushed or partly removed, and the snails set upside down on a piece of coarse paper; they are then sprinkled with a little vinegar and applied at once to the soles of the feet, on which they produce an irritation greater than mustard, and which is supposed to be efficacious in some cases of fever.

THE British Association partook this year somewhat of the nature of a Church Congress; the real Church Congress has, *en revanche*, partaken somewhat of a British Association meeting, Prof. Pritchard having communicated a paper to it giving his view of certain conclusions to be drawn from our present knowledge of molecules, and quoting in support of it the honoured names of Herschel and Clerk-Maxwell. As we are informed that the paper will be published *in extenso* elsewhere, we need not refer to it at any length here; but there is one bit of it which, coming from a clergyman and a professor at Oxford, we cannot refrain from quoting. He suggests that it would be a good thing "if in the study of every manse throughout England there were found a well-used microscope, and on the lawn a tolerable telescope; and, best of all, if those who possess influence in our national universities could see their way to the enforcement of a small modicum of the practical knowledge of common things on the minds of those who are to go forth and do battle with the ignorance and failings of our population, and to spread light throughout the land. A little knowledge of the ancient elements, fire, air, earth, and water, would save many a young clergyman from the vanity of ridiculous extremes, and from the surprise of the more wisely and widely educated among his flock." Surely no one will think that with regard to the Universities Prof. Pritchard is asking too much! He then goes on: "Depend upon it, whatever may be our suspicions or our fears, the pursuit of the knowledge of the works of nature will increase, and increase with an accelerated velocity; and if our clergy decline to keep pace with it, and to direct it into wholesome channels, they and their flocks will be overtaken, though from opposite directions, by the inevitable Nemesis of disproportion."

A SEVENTH edition of "The London Catalogue of British Plants" has just been issued. The chief differences between this and the preceding edition is in a renumbering of the specific names, and in those changes of technical arrangement which have now rendered it necessary to abandon the original series of numbers. The first edition of 1844 was closely adapted to the "British Flora" of the late Sir Wm. Hooker. This seventh edition is made to correspond with the "English Botany" of Dr. Boswell-Syme, third edition, as far as to the grasses. For the ferns and allied orders, the arrangement and nomenclature of Dr. Hooker's "Student's Flora" are closely followed. The species of Chara are taken from Prof. Babington's "Manual of British Botany." Mr. Backhouse is followed in the species of Hieracium; Prof. Babington in the Rubi; Mr. Baker in Wild Roses.

THE *Gardener's Chronicle* quotes from the *Illustration Horticole* that the recent International Botanical Exhibition at Florence yielded a net profit of 1,000*l.*, and that the disposal of this sum to the best advantage of horticulture is under consideration.

A SCHOOL of Mines has been established by the Territorial Government at Golden, Colorado, one of the best places in the country for practical instruction.

THE Sixth Annual Report on the noxious, beneficial, and other insects of the State of Missouri has been issued.

MR. EDWARD BELLAMY, of the Charing Cross Hospital, has been appointed to deliver the course of lectures on the Anatomy of the Human Form, at the South Kensington Museum.

"ELEMENTARY Astronomy, or Notes and Questions on the Stars and Solar System" (Van Voorst), a small text-book for the use of schools, by C. C. Reeks, contains a great deal of recent and accurate information in small space, and seems calculated to serve the purpose for which it is intended.

THE additions to the Zoological Society's Gardens during the past week include an Australian Rail (*Rallus pectoralis*) from New Holland, presented by Mr. J. Harris; a Gannet (*Sula bassana*), European, presented by Mr. R. R. B. Norman; a White-winged Trumpeter (*Psophia leucoptera*) from S. America; a Dusky Monkey (*Semnopithecus obscurus*) from Malacca; a Pinche Monkey (*Midas œdipus*) from New Granada; a Bonnet Monkey (*Macacus radiatus*) from India, deposited.

ON THE NECESSITY FOR PLACING PHYSICAL METEOROLOGY ON A RATIONAL BASIS.[*]

I WISH at the outset pointedly to disclaim originality in the main ideas to which I propose here to invite attention. The subject of my paper has occupied the thoughts of many men of science, with some of whom I have been in communication regarding it for several years. But though the conclusions to which I wish to lead you are the product of many minds, I am bound to accept to the fullest extent the self-imposed responsibility of bringing them forward at the present time and in the present form.

The branch of inquiry which has been very unsignificantly named Meteorology (meteoric phenomena being but slightly and remotely included in it) deals with the climate of the globe, and seeks to explain the vicissitudes of temperature and moisture, storm and calm, to which that globe is exposed. It is a subject of the highest importance to mankind generally, as affecting health, navigation, and agriculture; and possesses an interest acknowledged by every individual, from the savage to the *savant*, influencing as it does the personal well-being and daily comfort of all. Everyone discusses, and thinks himself competent to discuss, the weather.

My present object necessitates a broad classification of this department of inquiry into two main branches. The more obvious one of these, for which a fitting name has yet to be proposed, relates to changes of weather from day to day, and to the varieties of climate found in different localities. I shall not say much on this branch of Meteorology, but shall confine myself principally to the other main division, which has been named—I believe, first by Prof. Balfour Stewart—Physical Meteorology. Under this term are included, amongst other important matters, fluctuations in the seasons; the causes, external to the earth, which occasion or contribute to them; and the laws which regulate these fluctuations. The opinion is daily gaining ground that this branch of Meteorology has been unduly neglected, that it offers a magnificent field of inquiry and discovery, and that its vigorous cultivation must greatly aid the solution of those more limited and local inquiries to which observation has been hitherto more particularly applied. My present object is to urge the cultivation of this wide and almost unoccupied field of research and to point out some of the steps which should now be taken to that end.

It will be necessary for my purpose first to advert to some of the most elementary facts connected with Meteorology. Speaking in general terms, there are but four principal elements concerned in the production of all meteorological phenomena—the familiar elements of antiquity—fire, water, earth, and air. The part played by each is obvious to every observer.

Water, sucked up by heat from the ocean, and from the land which has imbibed it, falls again from the clouds in the form of rain, undergoing alternately, through excess of heat, evaporation and condensation. *The earth*, a great recipient of both heat and moisture, gives up each gradually and silently, and helps to maintain equability of temperature and of humidity. *The air*, set in motion by heat locally applied, becomes breeze, or wind, or storm, according to the amount, duration, and locality of that heat. In each of these three cases we see that an external force, heat, plays a conspicuous part. Can either of the three named elements, Water, Earth, or Air, perform its functions without the aid of that external force? Have they any innate power, enabling them to act independently of each other, or of all external forces? Will water, if left to itself at an unchangeable temperature, rise into vapour and fall in rain? What power resides in the earth to cause meteorological phenomena? It may possibly be replied that it boasts volcanic power, but as this exists only locally, it can play but a small part in the great economy of the whole earth. The internal heat of the globe may also be claimed as an independent attribute of the earth, and it may be so—but on this question we have as yet but very little reliable knowledge, though much interesting speculation. It may, however, be stated that, as an explanation of leading meteorological phenomena, the internal heat of the globe has not as yet been allowed much, if any, weight, though its use as a modifier of such phenomena may be considerable. As to the air, no innate power has hitherto been assigned to it. We may therefore, without much risk of error, regard water, earth and air, for the purpose of the present inquiry, as three forms of inert matter, capable of exercising independently no force whatever, but when acted upon, either separately or in combination, by heat, capable of producing the most stupendous results.

We come now to this heat—the sun. Has this any innate power? It seems almost needless to answer the question. The most familiar occurrences attest his paramount influence: the alternations of day and night, the march of the seasons, the daily variations of warmth—all bear testimony to his all-pervading and tremendous power.

It might seem superfluous to state facts which are almost truisms. But would it not seem to follow as a matter of course, needless to dwell upon, that such being the paramount influence of the sun, its study must be the first and most anxious object of solicitude to the meteorologist? Yet such is not the case. Obvious as are the facts I have briefly indicated, they have led to no such result. The reports and volumes of observations emanating from bodies and institutions charged with meteorological researches often do not contain even the name of the sun, and it may be broadly stated that the great central source of heat, and therefore of all meteorological activity, receives little or no attention in that capacity. I do not prefer this as an indictment against those to whom I refer. Many reasons may be assigned for their total neglect of the sun. Perhaps amongst the most valid is the fact that instrumental appliances fitted for the purpose have not, until within a comparatively recent period, existed.

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[*] By Lieut.-Col. A. Strange, F.R.S., Inspector of Scientific Instruments to the Indian Government; a paper read at the British Association.